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RESEARCH TRAINING OPPORTUNITIES: THE NATIONAL INSTITUTE ON AGING GERONTOLOGY RESEARCH CENTER

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RESEARCH TRAINING OPPORTUNITIES AT THE NATIONAL INSTITUTE ON AGING GERONTOLOGY RESEARCH CENTER

"The intramural programs of
the National Institutes of Health comprise
one of the most prestigious biomedical research
organizations in the world.
Scientists in the intramural program have
been responsible for many major scientific achievements
and have been accorded recognition in many ways."
—PRESIDENT'S BIOMEDICAL RESEARCH
PANEL REPORT, 1976

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
National Institutes of Health
NIH Publication No. 80-482 July 1980

PREFACE

Without question, the researcher who wishes to study how people change with age—biologically, socially, or behaviorally—faces an enormous challenge. Aging affects all of us and involves every body system. Moreover, advances in health care have resulted in a rapid increase in the number of older people and in their proportion relative to the entire population.

These factors have led to a recent surge of interest in geriatrics and gerontology among researchers, health care and social service providers, policymakers, and the general public. In 1974, Congress created the National Institute on Aging (NIA) as a part of the National Institutes of Health (NIH) to "conduct and support biomedical, social and behavioral research and training related to the aging process and the diseases and other special problems and needs of the aged."

With NIA's creation came the expansion and strengthening of the multidisciplinary aging research programs of the Gerontology Research Center (GRC) in Baltimore, Maryland. The Institute's unique and outstanding intramural research facility now offers the aspiring gerontologist optimal opportunities for pursuit of investigations in his or her field of interest.

This brochure is designed to inform recently trained physicians and research scientists of continuing opportunities for postdoctoral laboratory and clinical experience with the NIA. Additional information on the training programs described in this publication is available from Dr. Richard C. Greulich, NIA Scientific Director, or from Dr. Reubin Andres, NIA Clinical Director, both c/o NIA Gerontology Research Center, Baltimore City Hospitals, Baltimore, Maryland 21224.

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NIA INTRAMURAL TRAINING PROGRAMS

Via three separate post-doctoral training programs, interested investigators may pursue research careers at the NIA's Gerontology Research Center in Baltimore, Maryland. Taken together, the Associate, Staff Fellowship and Visiting Training Programs allow American and foreign scientists at various stages of their research careers to participate in sophisticated gerontology research programs. The Institute does not discriminate on the basis of sex, race, color, age, handicap, or national origin in the selection of trainees.

Laboratory of Neurosciences Staff Fellows, Drs. Diana Dow-Edwards (l.) and Edythe London, observe autoradiographs of rat brain to assess glucose metabolism.

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THE ASSOCIATE TRAINING PROGRAM

Types of appointments:

Clinical Associate

- Participates primarily in clinical research using human subjects. Laboratory research may also be a part of the program.
- Senior investigators will supervise associate's clinical activities, which include rounds, conferences and other instructive opportunities.
- Limited residency and/or subspecialty credit may be accorded associates in several of the training programs.

Research Associate

- Devotes majority of time to laboratory research which may include *in vitro* studies and/or *in vivo* investigations with various animals.
- A preceptor will guide the associate in research methodology and design with an emphasis on a broad variety of laboratory problems and different approaches rather than on one or two refined techniques.
- Research associates may also participate in several special seminars.

Open to:

- M.D.'s, D.D.S.'s, or those with equivalent clinical degree.
- Preference is given to candidates who intend to pursue careers in investigative and academic medicine.
- Candidates must be U.S. citizens or be eligible for citizenship within 4 years.

Length of appointment:

Two years, with possible extension of one additional year.

Salary:

Depending upon level of experience and civilian or military status. yearly salaries range from $22,332 to $37,518.*

Additional opportunities:

- With appropriate approval, associates may participate in related clinical activities of the Baltimore City Hospitals (a Johns Hopkins University affiliate) and in activities of other academic institutions in the Greater Baltimore area. Such clinical experience may qualify the associate for certification in a subspecialty (e.g., endocrinology, cardiology, psychiatry).
- A limited number of candidates may apply for a 3-year program of clinical research training in collaboration with: a) the division of cardiology, department of medicine, Johns Hopkins University; b) the department of psychiatry, Johns Hopkins University; or c) the department of medicine, Baltimore City Hospitals. Under this program, the associate spends the first year in clinical training either as a resident physician or clinical fellow in one of the above departments. In the second and third years, associates participate in clinical and basic research at the GRC in laboratories which correlate to their first year's experience (e.g., Clinical Physiology Branch, Laboratory of Behavioral Sciences).

How to apply:

- Contact potential sponsoring investigators at the Gerontology Research Center or apply directly to Dr. Reubin Andres, Clinical Director, NIA, GRC, Baltimore City Hospitals, Baltimore, Maryland 21224. The names of senior staff scientists and a description of their programs appear later in this brochure.
- Currently, candidates are formally interviewed by potential sponsors 8-12 weeks after receipt of completed applications. A final offer of associateship may be made as soon as 3 weeks following the interview.

For more information:

A publication entitled *Associate Training Programs in the Medical and Biological Sciences at the National Institutes of Health* is available from the NIH Associates Office, National Institutes of Health, Bethesda, Maryland 20205.

*All salary figures in this brochure are for fiscal year 1980. Salaries for future years will reflect a cost-of-living increase.

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THE STAFF FELLOWSHIP PROGRAM

Former Staff Fellow, Dr. Steve Hausman, separates fluorescent-labeled mouse antibody from unlabeled material by column chromatography in connection with studies of the aging immune system conducted at the NIA Gerontology Research Center.

Types of appointments:

Staff Fellow and Senior Staff Fellow

- Advance their careers and professional experience through collaboration and participation in research with NIA scientists and other invited investigators working at the GRC.
- Staff and senior staff fellows differ primarily in level of experience. Candidates for the staff fellowship have less than 3 years of professional level experience. Candidates for the senior staff fellowship have from 3 to 7 years of professional level experience or are physicians with 3 or more years of specialty training.

Open to:

- M.D.'s (or those with equivalent clinical degree), D.D.S.'s and Ph.D.'s.
- Candidates must be U.S. citizens or be eligible for citizenship within 4 years.

Length of appointment:

Two years, with possible extension to a total of 4 years in a non-tenure status.

Salary:

Staff Fellows	*Senior Staff Fellows*	
$19,740-$29,541	$22,365-$40,144	M.D.'s
$15,120-$28,818	$19,740-$32,312	Other doctorates

Additional opportunities:

- Completion of staff fellowships may qualify some candidates for permanent positions at the NIH under the Office of Personnel Management or with the Public Health Service Commissioned Corps.
- Additional training during the fellowship, either within or outside the NIH, may be available to fellows at Government expense.

How to apply:

- Contact potential sponsoring investigators at the Gerontology Research Center or apply directly to Dr. Richard C. Greulich, Scientific Director, NIA, GRC, Baltimore City Hospitals, Baltimore, Maryland 21224. Names of senior staff scientists and descriptions of their programs appear later in this brochure.
- Applications are accepted year-round; however, to assure optimal placement, candidates should apply as far in advance of their availability as possible.

For more information:

A publication entitled *NIH Staff Fellowship Program* is available from the Personnel Staffing Branch, Division of Personnel Management, National Institutes of Health, Bethesda, Maryland 20205.

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THE VISITING PROGRAM

Types of appointments:

Visiting Fellow

- Participates in NIA investigations as an advanced research trainee.
- Each visiting fellow works closely with a senior NIA investigator who serves as sponsor or supervisor during the period of appointment.
- During the fellowship period, visiting fellows may not hold outside employment or accept assignments away from their sponsors.
- Candidates for the visiting fellowship should have no more than 3 years of postdoctoral experience by the time the fellowship begins.

Visiting Associate and Visiting Scientist

- Participate in NIA investigations as research scientists. They, too, work closely with an NIA investigator designated as their sponsor.
- Visiting associates must have 3 to 6 years of postdoctoral experience by the time their appointment begins.
- Visiting scientists must have more than 6 years' postdoctoral experience and a record of research excellence prior to employment with the NIA.

Open to:

- M.D.'s, D.D.S.'s, Ph.D.'s or those with equivalent education in a health sciences field.
- Resident and nonresident aliens may apply. U.S. citizens are not eligible.
- All applicants must be fluent in the use and understanding of the English language, both written and spoken.

Length of appointment:

- Visiting fellows—initial training award is for 1 year with possible renewal of up to 2 years.
- Visiting associates and scientists—initial 12- or 13-month appointment, with possible renewals not to exceed a 4-year total.

Salary:

Current stipend levels are as follows:

- Visiting fellows—

$13,000 for less than 1 year postdoctoral experience

$13,600 for 1 to 2 years' postdoctoral experience

$14,200 for 2 to 3 years' postdoctoral experience.

- Visiting associates—$15,920 to $25,041, depending on experience.
- Visiting scientists—$23,087 to $47,500, depending on experience.

Additional opportunities:

- Additional training during the appointment, both within and outside the NIH, may be available at Government expense.
- The International Visitors Center at the NIH provides valuable help to foreign visitors before, during and after their arrival. The center has information about many aspects of living in the United States, including materials on legal requirements for foreign nationals, places to live, things to bring, community services, etc.

How to apply:

Contact potential sponsoring investigators at the Gerontology Research Center or apply directly to Dr. Richard C. Greulich, Scientific Director, NIA, GRC, Baltimore City Hospitals, Baltimore, Maryland 21224. Names of senior staff and descriptions of their programs appear later in this brochure.

For more information:

A publication entitled *The NIH Visiting Program* is available from the International Visitors Center, John E. Fogarty International Center for Advanced Studies in the Health Sciences, National Institutes of Health, Bethesda, Maryland 20205.

Visiting Fellow, Dr. Aleksander Perski, monitors behavioral conditioning of cardiovascular responses to exercise in a patient with angina pectoris. Dr. Perski works in the Psychophysiology Section, Laboratory of Behavioral Sciences.

View of the National Institute on Aging Gerontology Research Center in Baltimore, Maryland, the largest Federal facility devoted to aging research in this country.

THE GERONTOLOGY RESEARCH CENTER

The intramural research program of the National Institute on Aging is currently located in the Gerontology Research Center in Baltimore, Maryland. Although a unit of aging research has operated continuously in Baltimore under NIH auspices since 1941, the current facility was built in 1968. This self-contained research center is located on the grounds of the Baltimore City Hospitals and is physically connected to the hospital complex. Nearly 200 scientists and support personnel now work in the modern laboratories, offices and conference rooms of the GRC.

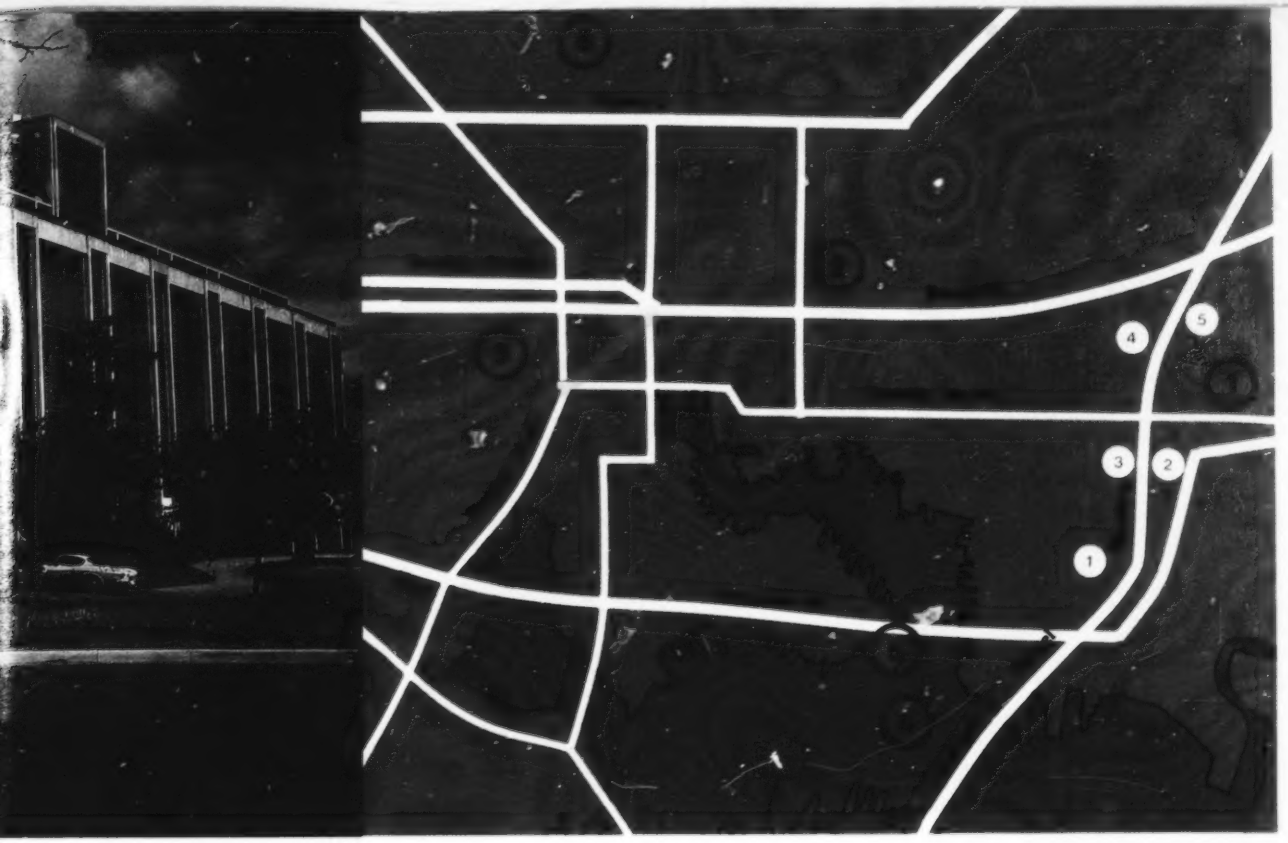
In addition to a distinguished scientific staff, the GRC offers a wealth of research resources for gerontology investigations that can be matched in few other facilities. A group of nearly 800 volunteer human research subjects; a large supply of research animals; frozen cells; highly specialized equipment and instruments; sophisticated computer systems; and photographic, art, library and information support services are among the many resources the center can provide.

The Baltimore Longitudinal Study of Aging

The Baltimore Longitudinal Study was initiated in 1958. Through repeated observations of the same subjects over a long period of time, true age changes can be quantified and the mechanisms underlying these changes can be elucidated. New research protocols are introduced as research questions arise and as new techniques for clinical investigations are developed.

Every 18 months,* volunteers ranging in age from 20 to 96 years report to the GRC for 2½ days of extensive clinical, biochemical, and psychological testing. Individuals are monitored for heart, kidney and lung function; body composition; capacity for exercise; carbohydrate and fat metabolism; drug

*Younger participants report to the center every 2 years, while older volunteers are tested annually.



metabolism; nutrition and endocrine variables; dental health; as well as behavioral and social variables. Longitudinal study participants constitute a resource not only for ongoing research studies but also for the introduction of new research protocols as the need arises. Male volunteers, who have participated in the study since its inception over 20 years ago, now number over 650. GRC scientists began recruiting a comparable group of women in 1978, and female volunteers now number nearly 200.

Animal Resources Facility

The GRC's animal resources facility is fully accredited by the American Association for Accreditation of Laboratory Animal Care and includes a veterinary surgical suite. Each year, thousands of animals are maintained and/or distributed to intramural scientists via this facility.

In 1978 alone, the center's open colony provided long-term care and housing for a variety of laboratory animals including rabbits, rats, mice, beagles, rhesus monkeys, squirrel monkeys, chickens, and a goat.

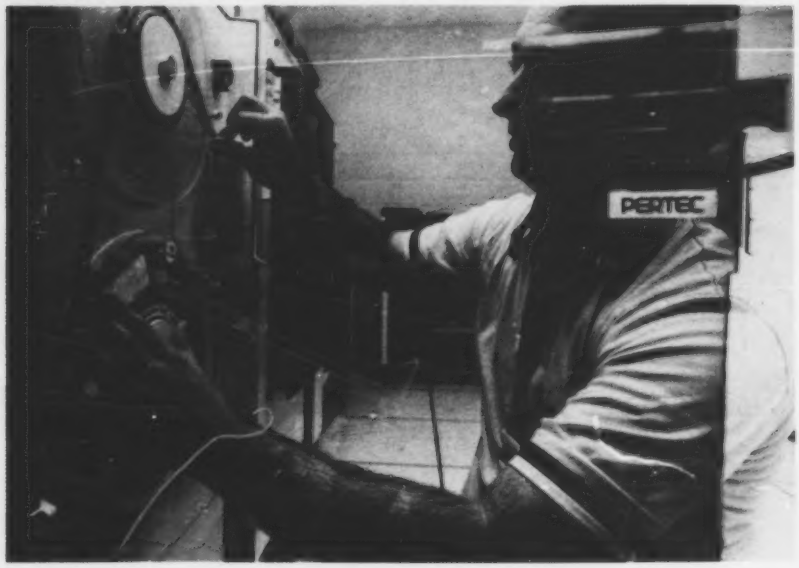
The center's closed colonies provide aged rodents for gerontological study. Rats and mice are maintained under carefully controlled environmental conditions. Scientific data relating to life span, growth patterns, organ weights, age-associated diseases and blood chemistry are already available for some of the rodent species. In the near future, the C57BL/6J mouse colony will number nearly 12,000 animals ranging in age from 1 to 32 months. The outbred Wistar rat colony is currently being increased from 10,000 to approximately 14,000, with animals ranging from 1 to 28 months of age.

Sketch map of downtown and east Baltimore shows various medical and other facilities near the Gerontology Research Center (GRC) of the National Institute on Aging. The white numbered circles represent northbound exits of the Baltimore Harbor Tunnel Thruway. The GRC and Baltimore City Hospitals are just between and to the right of Exits 4 and 5. Approaches from the south to the GRC can be made from either Exit 3 or 4.

1. Gerontology Research Center, National Institute on Aging
2. Johns Hopkins Medical Institutions
3. University of Maryland Medical Center
4. Baltimore Harbor
5. Historic Fort McHenry
6. Johns Hopkins University
   U.S. Public Health Hospital

Human lymphocytes stained with fluorescein diacetate (green) or ethidium bromide (red). A green cell is viable (alive); a cell which stains red is dead. Therefore this is a viability stain for determining the viability of a lymphocyte population.

A programmer at the Gerontology Research Center, Cosimo Rubino, threads a data tape in one of the data processing rooms at the Baltimore NIA Center.



Cell Resources

Intramural scientists can obtain a wide variety of frozen cell samples from the NIA's Cultured-Cell Repository in Camden, New Jersey. Supported by the Institute's extramural research program, this cell bank currently establishes, characterizes, stores and distributes standard and genetically marked cell lines for aging research. The four major types of cell lines available from the repository are: 1) human cell lines derived from normal individuals (from the fetal stage to old age); 2) strains of cells derived from individuals with abnormal growth disorders which feature symptoms of accelerated aging, such as progeria; 3) cells derived from originally normal lines transformed by virus infection; and 4) cell lines derived from individuals at high risk to cancer.

In addition, several hundred human cell lines have been established by NIA scientists using skin samples from men of various ages who are participants in the Baltimore Longitudinal Study.

Technical Development Section

Technicians in the Technical Development Section maintain existing equipment and devise new equipment and instruments to meet special needs of the center's investigators. Recent examples of the Technical Development Section's creativity include hemispherical rat exercisers, cell harvesters, a muscle chamber for laser diffraction studies, and an EM tissue processor.

Computer Systems

In 1979, the GRC added a second computer system to its current setup, thus doubling its present capacity. The addition of two tape drives will provide the system with increased disc space, memory, tape speed, and computational capability. The Technical Development Section also continues to develop a wide variety of microprocessor computer systems to meet the changing instrumentation needs of center scientists. Finally, a system has been developed to transfer data from the laboratory microprocessor system to the main computer, via programmable read-only memories.

View of an NIA investigator in study carrel as seen through the stacks of the gerontology and geriatrics library housed in the Gerontology Research Center.

Other Support Services

Each year the center's Photographic and Arts Section provides intramural scientists with illustrations, photographic prints, and slides. This section also helps to plan and produce visual materials for research studies themselves, as with the study of distributive practice and recall conducted by the intramural Learning and Problem Solving Section.

The GRC Library is a working research library which includes among its holdings books and journals in many disciplines, such as biochemistry, endocrinology, physiology, psychology, and immunology. In addition, it is a specialized library housing thousands of books, periodicals, and reprints pertaining to gerontology and geriatrics. Scientists can borrow reference materials from other academic and research institutions (including the National Library of Medicine and the Library of Congress) via the interlibrary loan privileges of the center's library. The online computer search terminal at the library allows researchers to access over five million references via the National Library of Medicine's MEDLINE and Bibliographic Research Service data banks.

MAJOR RESEARCH PROGRAMS

CLINICAL PHYSIOLOGY BRANCH (CPB)

Reubin Andres, M.D., Chief

Research in the CPB is primarily concerned with physiological changes which occur throughout the entire adult life span. Studies include quantification of age changes, as well as elucidation of mechanisms underlying these changes and of the relationship between aging processes and specific disease states.

Endocrinology Section, CPB

Robert I. Gregerman, M.D., Chief

This section conducts studies on: 1) molecular basis of age-related changes in hormone response, especially those related to the biochemistry of the adenylate cyclase system and hormone receptors; 2) aging and endocrinology of the reproductive system; and 3) enzymology and peptide chemistry of the reninangiotensin system. Clinical studies are conducted on normal human subjects from the Baltimore Longitudinal Study of Aging. A variety of organ and hormone studies are also performed on rodents of all ages.

Cardiovascular Section, CPB

Edward G. Lakatta, M.D., Chief

Scientists in this group use noninvasive techniques to investigate cardiovascular hemodynamic function in man. A variety of experimental techniques are used in animal models such as the rat and dog. Studies on the effects of age on biophysical properties of cardiac muscle are also conducted in animal models.

Metabolism Section, CPB

Reubin Andres, M.D., Chief

This section conducts research on the kinetics of glucose homeostasis and its endocrine control. Factors controlling insulin secretion, including gastrointestinal insulinotropic hormone, are quantified using the servo-control glucose clamp technique. Clinical investigations in man assess interrelationships between chronological age, obesity, diabetes, serum lipids, diet, and physical activity. Biological rates of aging in multiple systems are also assessed. Isolated perfused rat pancreas preparations supplement human studies.

Immunology Section, CPB

William H. Adler, M.D., Chief

Studies focus on the decline in host immune responsiveness seen with aging. Investigations involve the development of diagnostic procedures for detecting relative immunodeficiencies in humans and the study of the mechanisms of these deficiencies in both humans and experimental animal models.

Human Performance Section, CPB

Arthur H. Norris, M.Sc., Chief

This section supports the Baltimore Longitudinal Study of Aging with work in a variety of areas. Studies are designed to monitor changes in body composition, exercise physiology, nutrition, neuromuscular function, psychomotor capacity, hearing and vision. Pulmonary physiology is studied in the context of genetic and environmental factors. Other work includes study of:

Scientists in the Metabolism Section give a longitudinal subject (in bed) a glucose tolerance test. A variety of such tests help researchers describe metabolism changes that occur with age.

Reginald Quilter demonstrates the bicycle exerciser used in the Psychophysiology Section for behavioral conditioning of cardiovascular responses to exercise in patients with angina pectoris.

1) the relation of blood pressure to psychomotor variables and intelligence; 2) dermatoglyphics in disease, world populations, twins, and aging; and 3) factors underlying reduced or altered sexual function in the aged.

LABORATORY OF BEHAVIORAL SCIENCES (LBS)

Bernard T. Engel, Ph.D., Chief

This laboratory conducts research on interactions between behavioral aging and physiological aging processes. Behavioral scientists in this lab are also trying to elucidate any changes in cognitive function that may occur over the adult life span.

Psychophysiology Section, LBS

Bernard T. Engel, Ph.D., Chief

This section investigates clinical applications of voluntary autonomic control. It also conducts studies on interrelationships between aging and both autonomic and psychophysiological responses in man. Using monkeys as a model system, researchers study cardiovascular and neurophysiological responses.

Learning and Problem Solving Section, LBS

David L. Arenberg, Ph.D., Chief

This section studies the effects of aging on motor behavior, perceptual skills, learning, memory, problem solving ability, and personality characteristics. Cognitive and perceptual function in man are examined, as well as learning and motor behavior in rodents.

Stress and Coping Section, LBS

Paul T. Costa, Ph.D., Chief

This section examines personality and its influence on the aging individual's ability and efforts to adapt to problems of adult life. Research focuses on coping mechanisms which adults have developed to deal with such stresses as physical declines and illness, retirement, and widowhood. Longitudinal analysis is employed to establish long-range predictors of coping success or failure.

Working in a cold room at the GRC, Visiting Fellow Dr. Masatoshi Nakano (r.) and technician Mr. Frank Colpo use column chromatography to separate and characterize enzymes found in rabbit renal cortex tissues. This is research conducted in the Intermediary Metabolism Section, Laboratory of Molecular Aging.

LABORATORY OF CELLULAR AND MOLECULAR BIOLOGY (LCMB)

Gunther L. Eichhorn, Ph.D., Chief

This laboratory conducts research basic to understanding the aging process at both the cellular and molecular levels. Emphasis is on genetic information transfer and environmental effects on the aging process.

Section on Inorganic Biochemistry, LCMB

Gunther L. Eichhorn, Ph.D., Chief

This section investigates the effects of metal ions on nucleic acid structure and on genetic information transfer, particularly RNA and protein synthesis. Primary concern is with mechanisms of introducing error into genetic information transfer. Age changes in structure of chromatin and ribosomes are also studied.

Section on Macromolecules, LCMB

Josef Pitha, Ph.D., Chief

Scientists in this unit study the interaction of cells with synthetic macromolecules. They probe age changes on the cell surface with specially designed macromolecules and also synthesize potential polymeric drugs. Studies are made on age-dependent physicochemical alterations of chromatin and its transcription; and on the production of abnormal proteins synthesized during the aging process.

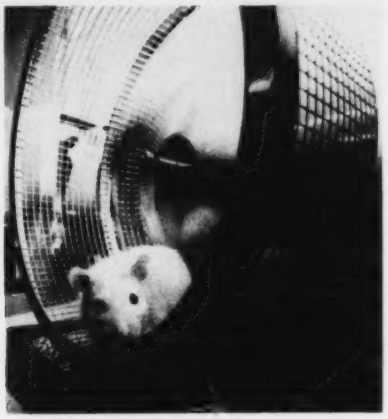
Section on Cellular Aging and Genetics, LCMB

This section's research concentrates on mechanisms of somatic and germ cell aging at the cellular and molecular levels. The genetic components of aging are examined through the use of biochemical and cytological technology.

LABORATORY OF MOLECULAR AGING (LMA)

Bertram Sacktor, Ph.D., Chief

The laboratory's biochemical, biophysical and physiological research focus is on membrane biology as it affects renal, cardiac, and neural functions. Problems and questions studied relate to: 1) molecular organization of the membrane; 2) mechanisms of vectorial ion and nonelectrolyte transport; 3) hormonal regulation of transport systems, including reception, transduction, and propagation of stimuli mediated via cyclic nucleotides; 4) isolation of carriers and reconstruction of functional synthetic membranes; 5) membrane turnover; and 6) membrane structure and function changes related to physiological dysfunction and cell "death."



Taking a short rest, this rat in the exercise wheel is taking part in a Cardiovascular Section study comparing cardiac function in physically conditioned (exercised) animals to sedentary control animals.

LABORATORY OF NEUROSCIENCES (LNS)

Stanley I. Rapoport, M.D., Chief

This laboratory investigates function, structure, physiology, biochemistry and pharmacology of the central and peripheral nervous systems and of muscle. It also examines those changes in these systems that take place during development and aging in animal models and in man. Investigators ask questions related to the following areas: 1) ultrastructure, transport, and permeability at the blood-brain barrier, blood-ocular barriers, and at peripheral nerves; 2) experimental modification of barrier permeability; 3) regional cerebral metabolism and blood flow in relation to brain function; 4) neuropharmacology in relation to stress, hypertension, and synaptic transmission; 5) neurophysiology of nerve, muscle, and synapses; 6) factors regulating neuronal death and neuron-neuron and neuron-effector organ interaction; and 7) neuroendocrinology. The laboratory also investigates, in man, the quantitative relation of regional cerebral metabolism to aging and dementia.

OFFICE OF THE SCIENTIFIC DIRECTOR (OSD)

Richard C. Greulich, Ph.D., Scientific Director

Section on Comparative Nutrition, OSD

Charles H. Barrows, Jr., D.Sc., Chief

Scientists in this section investigate relationships between aging and nutrition in animal populations. Specific areas of study include: 1) effects of age on absorption, distribution and utilization of known nutrients; and 2) mechanisms responsible for increased life span associated with dietary restriction. These studies rely on physiological, biochemical and electron microscopic techniques.

CONCLUSION

Gerontology is a relatively new discipline. It is constantly evolving as advances in technology provide the tools to test previously untestable aging hypotheses. Furthermore, there are many questions emerging as to the real nutritional needs of adults, the proper use of drugs and drug handling, and how people adapt both physiologically and psychologically to age-related changes.

In the 1980's, the GRC plans to initiate research into such important areas as adult nutrition, geriatric medicine, and the pharmacology of aging. Postdoctoral research trainees at the center will be able to participate in these and other innovative programs.

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1 Gerontology Research Center, National Institute on Aging

2 Johns Hopkins Medical Institutions

3 University of Maryland Medical Center

4 Baltimore Harbor

5 Historic Fort McHenry

6 Interstate 95

7 Baltimore Beltway Interstate 695

8 Interstate 83

9 Interstate 70

10 Social Security Administration

11 Columbia, Maryland

12 Route 29

13 Baltimore-Washington Parkway

14 Baltimore-Washington International Airport

15 Bowie, Maryland

16 Annapolis, Maryland & U.S. Naval Academy

17 Chesapeake Bay Bridge

18 Route 50

19 National Institutes of Health

20 National Naval Medical Center

21 Bethesda, Maryland

22 Interstate 270

23 Laurel, Maryland

24 University of Maryland Main Campus

25 Washington Beltway Interstate 495

26 Andrews Air Force Base

Satellite Photo:
Courtesy National Aeronautics
& Space Administration.

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